

Study of Hyperbaric Oxygen Therapy in Diabetic Patients with Foot Ulcers

Thesis

*Submitted for Partial Fulfillment of Master degree
in Internal Medicine*

By

Naglaa Youssri Mohamed Mahmoud Mourshed

M.B.B.Ch.

Ain Shams University

Supervised by

Prof. Dr. Raef Malak Botros

Professor of internal medicine
Faculty of Medicine- Ain Shams University

Dr. Mona Mohamed Abd Elsalam

Assistant Professor of internal medicine
Faculty of Medicine- Ain Shams University

Dr. Rania Said Abd Elbaky

Assistant Professor of internal medicine
Faculty of Medicine- Ain Shams University

**Faculty of Medicine
Ain Shams University**

2014

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالَ

سَبِّحْكَ لَا إِلَهَ إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْعَظِيمُ

صدق الله العظيم

سورة البقرة الآية: ٣٢



First, I wish to express my deep thanks, sincere gratitude to

ALLAH

*who always helps me, care for me and granted me the ability to accomplish this thesis. I would like to express my deepest gratitude, thanks and gratefulness to **Prof. Dr. Raef Malak Botros**, Professor of Endocrinology and Metabolism, Faculty of Medicine – Ain Shams University, for his enthusiastic support, encouragement valuable scientific advices, and great help through out of the accomplishment of this work, May God bless him.*

*My sincere thanks to **Dr. Mona Mohamed Abd Elsalam**, Assistant Professor of Endocrinology and Metabolism, Faculty of Medicine - Ain Shams University, for her kind and meticulous supervision, support, help, valuable supervision all through the work,*

*Many thanks, and sincere gratitude to **Dr. Rania Said Abd Elbaky**, Assistant Professor of Endocrinology and Metabolism, Faculty of Medicine - Ain Shams University, for her kind supervision encouragement and meticulous revision of this work,*

*Words can never express my sincere thanks to **my mother, my husband, my sister, my brothers and my dear Dr. Hamdy Emam** head of HBOT department for their generous support and continuous encouragement.*

*I would like to express my overlasting gratitude to all **my dear colleagues, friends** and all who offered me any kind of help, encouragement wishing them the best of all.*



Naglaa Youssri

Dedication

Words can not express my thanks, gratefulness, respect and love to **soul of my father** without his help, support, patience and encouragement, I would have never achieved any success.



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List of Abbreviations

Abb.	Meaning
ACCORD	Action to Control Cardiovascular Risk in Diabetes
ACE	Angiotensin-converting enzyme
ADA	American diabetes association
AGEs	Advanced glycosylated end products
ARBs	Antiotensin receptor blockers
ATA	Atmospheres absolute
BG	Blood glucose
BMI	Body mass index
CN	Charcot neuroarthropathy
CVD	Cardiovascular disease
DCCT	The diabetes control and Complications trial
DKA	Diabetic ketoacidosis
DM	Diabetes mellitus
DNA	Deoxyribonucleic acid
DR	Diabetic retinopathy
DSPN	Distal symmetric polyneuropathy
ELISA	Enzyme linked immunosorbent assay
ESRD	End stage renal disease
FDA	Food and drug administration
FPG	Fasting plasma glucose
FPG	Fasting plasma glucose
GDM	Gestational diabetes mellitus
GFR	Glomerular filtration rate
GTT	Glucose tolerance test
HbA1c	Glycated hemoglobin
HBOT	Hyperbaric oxygen therapy
IDDM	Insulin-dependent diabetes mellitus
IFG	Impaired fasting glucose
IGT	Impaired glucose tolerance
ITT	Insulin tolerance test
IV	Intravenous
Kpa	Kilopascal

Abb.	Meaning
LOPS	Loss of protective sensation
MODY	Maturity onset diabetes of the young
NPWT	Negative pressure wound therapy
OGTT	Oral glucose tolerance test
OGTT	Oral glucose tolerance test
PAD	Peripheral arterial disease
PN	Polyneuropathy
P02	Partial pressure of oxygen
RCW	Removable Cast Walkers
SMBG	Self monitoring blood glucose
SOD	Superoxide dismutase
TCC	Total Contact Cast
UHMS	Undersea and Hyperbaric Oxygen Society
UKPDS	Prospective Diabetes Study
VEGF	Vascular endothelial growth factor
VEGF	Vascular endothelial growth factor
VPT	Vibmration perception threshold
WHO	World health organization

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Introduction



INTRODUCTION

Diabetes is a metabolic disorder of multiple causes characterized by chronic hyperglycemia and disorders of carbohydrate, fat, and protein metabolism (**Ambler , 2006**). The chronic hyperglycemic state is associated with long term damage, dysfunction, and failure of various organs especially the eyes, kidneys, nerves, heart and blood vessels (**ADA, 2007**). Diabetic foot ulcer is a major complication of diabetes mellitus, and probably the major component of the diabetic foot (**ADA, 2009**). It occurs in 15% of all patients with diabetes and precedes 84% of all lower leg amputations. Major increase in mortality among diabetic patients, observed over the past 20 years is considered to be due to the development of macro and micro vascular complications, including failure of the wound healing (**Brem, 2007**). The development of lower extremity ulcer is a well known potential complication for patients with diabetes (**ADA, 2009**). There are three main factors involved in the pathology of the diabetic foot; neuropathy, ischemia and infection. The relative role played by each element can vary (**Inlow, 2000**). In spite of adequate pulses and large vessel perfusion, some diabetic patients still develop wounds that appear to be hypoxic/ischemic and fail to heal. There are also

functional abnormalities of the microcirculatory system in diabetic patients that may impair local blood flow and oxygen delivery, thus delaying wound healing (**Ong, 2008**). Hypoxia can cause amputation. Hyperbaric oxygen increase the amount of oxygen dissolved in plasma, allowing tissues to achieve better levels of oxygenation (**ADA,2001**).

Hyperbaric oxygen therapy (HBOT) involves the inhalation of 100 percent oxygen at pressures 2 or 3 times greater than atmospheric pressure at sea level (**UHMS, 2002**). One of the most common indications for HBOT is to aid healing of diabetic foot wounds (**Ong, 2008**). Hyperbaric oxygen therapy has been suggested to improve oxygen supply to wounds and therefore improve their healing (**Kranke, 2012**). Hyperbaric oxygen therapy is conjunction with aggressive multidisciplinary therapeutic protocol is effective in decreasing major amputation in diabetic patients with foot ulcer (**Milano, 2000**).



Aim of the Work

